



COMPUTER SKILLS: A CRITICAL LITERATURE REVIEW AND ITS IMPLICATIONS

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ABSTRACT

This review summarizes the relevant research on the use of computer science textbooks to enhance computer skills in higher secondary school students. Specifically, it reviews studies that have touched upon the merits of computer skills in schools, barriers or challenges encountered in the use of computers, factors influencing successful ICT integration, in-service and pre-service teachers' attitudes, perceptions, and confidence in computer skills as well as the importance of computer science textbook in different boards at various school culture in the use of a computer. This review discusses gaps in the literature and the directions that future studies may take to address these gaps.

KEYWORDS: *Technology Integration; computer skill; Teachers' attitudes; computer science textbook; higher secondary school students.*

BACKGROUND

For several years, education authorities have responded to the importance of school students developing computer literacy by including it as part of the school curriculum, directly as a cross-curriculum capability, and by assessing the extent to which students are computer literate. Computer literacy and related concepts, such as ICT literacy, are defined to include both technological expertise and information literacy. Assessments of computer literacy, even though they vary, indicate that there are substantial variations in levels of computer literacy among students in the lower years of secondary school. In technologically developed countries, approximately one-half of Year 8 students demonstrate proficiency, or advanced proficiency, in computer literacy, but up to 10% have very limited computer literacy. Assessments of computer literacy can also provide the basis for progression maps that could be used to inform curriculum development. Those progression maps will be more valuable if the frameworks on which they are based become more strongly integrated.

In addition, computer literacy appears to be influenced by student background, including familiarity with computers, as well as the emphasis placed on it in classrooms and schools and the support provided by ICT in education systems. At present, there is less information about school and classroom influences on computer literacy than there is about student background influences. In the immediate future, the construct of computer literacy may need to accommodate increasingly changes in

software and hardware contexts in which it is manifested (Ainley, 2018).

In the past decade, several studies have measured ICT competencies from the perspective of ICT self-efficacy. Such indirect measurements tend to have validity problems, as they depend on the pupils' ability to judge their ICT competencies. This study outlines the development of a performance-based digital test and the validation of a direct measure of ICT competence through the use of item response theory (IRT). More specifically, the test and the developed measure focus on primary-school pupils' proficiency in digital information processing and communication (Aesaert, K., van Nijlen, D., Vanderlinde, R., & van Braak, J, 2014).

In search of factors that affect pupils' ICT competencies, research has developed and empirically validated several conceptual frameworks. Although these frameworks are valuable ways of initially identifying factors related to pupils' ICT competencies, they do not take into account the broader classroom and school context in which pupils are embedded. Moreover, most frameworks and their corresponding instruments focus on post-primary education. This study first presents a multilayered model that can be used to guide future studies that try to explain why some primary-school pupils are more effective in acquiring ICT competencies than others. Factors are situated on the pupil, classroom and school level. Second, this study provides future research with a range of reliable measurement instruments to identify factors related to primary school pupils' ICT competencies (Aesaert, K., van Braak, J., van Nijlen, D., & Vanderlinde, R. 2015).



The research field of digital competencies (also referred to as competencies), computer skills and information literacy is strongly connected with education, computers, information science and libraries. This is reflected in the mapping of papers in this field to the broader classification area of Education and Educational Research in the citation database Web of Science as well as Information Science and Library Science and Computer Science. Publications in these research areas are principal contributors to published research outcomes. However, cooperation and co-citation between different research groups, as reflected by the respective research areas, seems rather weak. Researchers remain confined in their particular professional and educational expertise without sufficient awareness of related research conducted in other areas. The scatter of research across the different areas and publications need to be elucidated to show potential for possible future synergy (Stopar, K., Bartol, T, 2019).

Ibrahim Usama and Alamro Abdulaziz (2021) investigated the effects of Infographics on Developing Computer Knowledge, Skills and Achievement Motivation among Hail University Students. The study aims to explore the difference between static infographics (SIs) and animated infographics (AIs) for developing e-learning and computer skills as well as increasing achievement motivation in students enrolled in e-learning and computer skills courses in the second term of 2018/2019 at the Preparatory Year Program at the University of Ha'il (UoH). Amer Mohammed and Elmetwali Mohammed (2020) studied the Impact of Distance Education on Learning Outcome in Computer Skills Course at Prince Sattam bin Abdulaziz University: An Experimental Study.

The present study aimed to explore the impact of distance education on the learning outcome of students in computer skills courses at Prince Sattam bin Abdulaziz University in Al-Sulail, Saudi Arabia. In this study, the learning outcome is represented in the student's academic achievement. Al Hashlamoun Nafeth and Daouk Lina (2020) examined the information Technology Teachers' Perceptions of the Benefits and Efficacy of Using Online Communities in Practice When Teaching Computer Skills Classes. This research explores how Information Technology (IT) teachers experience the use of online communities of practice (CoP) in teaching a computer course called Computer Skills 2 (WRCO2). This course is the second of two computer skills courses in the Work Readiness Program (WRP) running at a Higher Education Institution in the Middle East (HEIME). This course focuses on the use of prior foundational knowledge acquired in the first course to develop understanding and proficiency in the use and application of computer skills and concepts.

Hsu Ting-Chia (2016) studied the effects of a Peer Assessment System Based on a Grid-Based Knowledge Classification Approach on Computer Skills Training. In this study, a peer assessment system using the grid-based knowledge classification approach was developed to improve student's performance during computer skills training. Baker William

(2013) Empirically assessing the importance of computer skills. This research determines which computer skills are important for entry-level accountants and whether some skills are more important than others. Students participated before and after internships in public accounting. Ragin Tracey (2013) examined administrators' perceptions of community college students' computer literacy skills in beginner courses. Fundamental computer skills are vital in the current technology-driven society. The purpose of this study was to investigate the development needs of students at a rural community college in the Southeast who lacked the computer literacy skills required in a basic computer course. Chi, Tai-Yin (2016) studied computer Skill Acquisition and Retention: The Effects of Computer-Aided Self-Explanation. This research presents an experimental study to determine to what extent computer skill learners can benefit from generating self-explanation with the aid of different computer-based visualization technologies.

METHODS

The abilities and attitudes of the fourth-year MUCHS medical students (MD4s) towards ICT were assessed using Questionnaire 1, an adapted version of a questionnaire developed by Jeannette Murphy j.murphy@chime.ucl.ac.uk at the Centre for Health Informatics and Multiprofessional Education (CHIME, <http://www.chime.ucl.ac.uk>) in London, UK, to assess ICT skills amongst first-year medical students (MD1s) attending University College London (UCL). The questionnaires were distributed to all MD4 students by Tanzanian student representatives, to be filled in independently, and were then collected by the representatives (Stopar, K., Bartol, T, 2019).

Amer Mohammed and Elmetwali Mohammed (2020) studied the Impact of Distance Education on Learning Outcome in Computer Skills Course at Prince Sattam bin Abdulaziz University: An Experimental Study. The researcher adopted an experimental approach. He selected a sample consisting of 80 male students from 4 sections of a computer skills course. Those students were divided equally into control and experimental groups. The members of the control group were taught by adopting a face-to-face instructional approach. They attended 4 face-to-face lectures. The members of the experimental group were taught online by using the Blackboard system. The researcher used a pre-test and a post-test for assessing students' academic achievement.

Al Hashlamoun Nafeth and Daouk Lina (2020) examined the information Technology Teachers' Perceptions of the Benefits and Efficacy of Using Online Communities in Practice When Teaching Computer Skills Classes. A phenomenological approach has been chosen to help understand and explore the qualitatively different ways in which particular teachers experience the use of online CoP as a social and collaborative learning system. Two specific questions were considered: How did teachers experience the use of online CoP in teaching the computer skills 2 classes? (2) What benefits, if



any, have been derived from using online CoP in teaching this course?.

Ragin Tracey (2013) examined administrators' perceptions of community college students' computer literacy skills in beginner courses. Guided by Greenwood's pragmatic approach as a reformative force in higher education, this action research study focused on understanding stakeholders' perceptions of students' computer skills, determining interventions to address deficiencies, and understanding the relationship between student's placement test scores and final course outcomes. Inquiry in this mixed method study included interview responses and correlational analysis of placement test scores, pretest scores, and final course outcomes in 4 beginning computer courses. Interviews with administrators and faculty provided perceptions concerning students' computer literacy skills, and data were coded to determine themes.

RESULTS

Ibrahim Usama and Alamro Abdulaziz (2021) investigated the effects of Infographics on Developing Computer Knowledge, Skills and Achievement Motivation among Hail University Students. The independent variables in this research consisted of SIs and AIs embedded learning content while achievement of e-learning and computer skills and achievement motivation were the dependent variables being observed. Pre-tests and post-test results showed that the learning materials positively influenced the students' computer skills, e-learning, and achievement motivation. This study revealed that the use of SI had a greater effect on female student learning while AI was found more effective for male student learning.

Amer Mohammed and Elmetwali Mohammed's (2020) study found that both groups share similar levels of computer literacy. It was found that distance education has a significant positive impact on student's academic achievement in the computer skills course. The researcher recommends adding online instructional activities to the curricula used in Saudi universities. Hsu Ting-Chia (2016) studied the effects of a Peer Assessment System Based on a Grid-Based Knowledge Classification Approach on Computer Skills Training. The study results showed that the learning achievements of the students using the proposed system were significantly better than those of the other two groups. Therefore, integrating the knowledge engineering approach with the peer-assessment process can benefit students' learning, and help them attain computer skills certification. The dynamic peer assessment with a knowledge classification approach is not only useful but can also be repeatedly applied to different question sets of the certificate of computer software application. Findings revealed that participants believed students need basic computer skills before attempting a beginning computer class, and no significant correlation was found among the test scores. It was concluded that while the computer placement test assessed theoretical understanding, it did not assess skills (Ragin Tracey, 2013).

Chi, Tai-Yin (2016) studied computer Skill Acquisition and Retention: The Effects of Computer-Aided Self-

Explanation. The self-explanation condition without visualization did not attain statistical significance in comparison to the control condition. The study did not detect statistical differences between the three methods of stimulating self-explanation, although the pattern of results was as predicted. Qualitative data collected from a learning experience survey regarding the subjects' opinions about self-explanation prompts showed that subjects in different treatment groups gave similar responses about how they benefited from self-explanation prompts for learning HTML. The qualitative data also revealed the learners' challenges to perform self-explanation activities, which can be used to improve the design of self-explanation implementation and future studies.

CONCLUSION

The data exploitation process (as defined and used by (Giorgi, 2009)) resulted in the identification of several themes. Similar themes were then grouped to form four central themes representing the essence of the original ones. The central themes were: (1) to promote student collaboration; (2) to redefine the teacher's role; (3) to encourage student engagement; and (4) to manage the teachers' increased workload. This was followed by a discussion of the benefits and challenges arising from using online CoP in teaching the course, as well as a description of the limitations of this study (Amer Mohammed and Elmetwali Mohammed, 2020). Baker William (2013) empirically assesses the importance of computer skills. The computer skills examined are accounting software, databases, e-mail or Internet, programming, spreadsheets, and word processing.

Students believe that grade point averages and all six computer skills are important. Faculty and recruiters believe all skills are important except programming skills. Differences exist based on audit versus tax and gender. Spreadsheet skills are by far the most important. Ragin Tracey (2013) study resulting recommendations promoted coaching and tutoring to assist students with low computer skills. With a focus on developing educational alternatives to better serve students, implementation of the recommendations may promote positive social change that benefits not only students needing support in developing computer skills but also the community as well. Interview and focus group data revealed recurring themes, such as the time allotted for the exam, the testing location, netbook computer problems, the testing software, the clarity of exam questions, and the overall purpose, i.e. critical thinking, of the exam. Conclusion: The value of using the exam for screening and assessment of information and computer skills for graduate students remains questionable. While the testing environment can be improved, the heart of the exam, i.e. critical thinking, can be demonstrated better with authentic assessments within the curriculum. Computer skills could then be addressed with an assessment checklist in the orientation and introductory courses (Krueger, J.M., and Ha, Y., 2012).



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